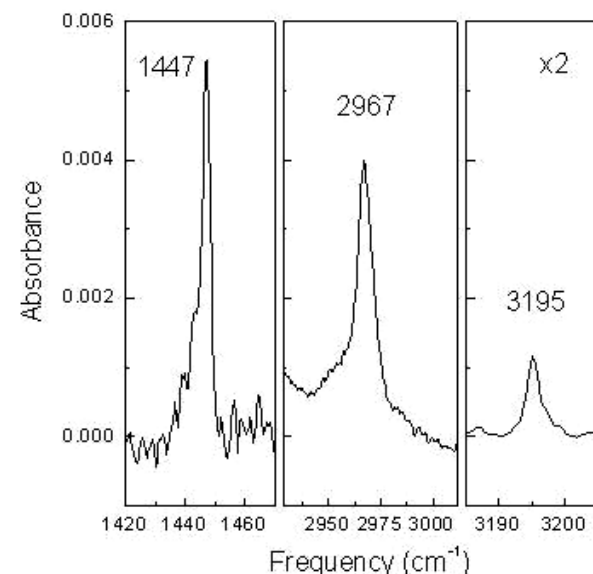
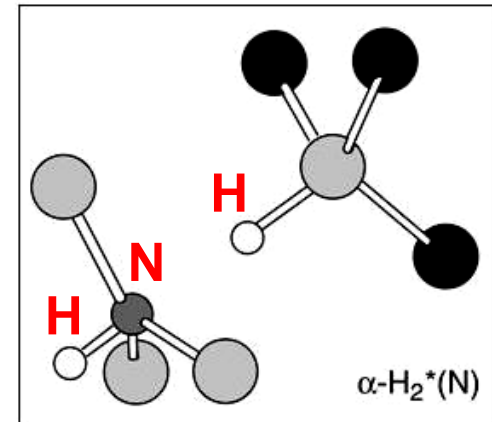


Structures and Properties of Hydrogen-Containing Defects in Semiconductors

Michael Stavola, Lehigh University, DMR 0108914

Hydrogen is an important impurity in semiconductors because it is introduced easily and is ubiquitous in the growth and processing environment. Once present, H modifies the electrical properties of semiconductors and the behavior of electronic devices.

For example, the dilute III-N-V alloys have been the focus of much recent attention because of their possible application in semiconductor lasers used for telecommunications. Hydrogen modifies the band gap energy of these materials. Theory has proposed an H_2^* structure (upper right) to explain the unusual shift of the band gap energy caused by H. Experimental work supported by NSF probes the vibrational properties of the H-containing defects in the III-N-V alloys (lower right), providing a structure-sensitive test of the microscopic defect models proposed by theory.



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Societal Impact and Education: The research work on H in semiconductors supported by NSF provides an opportunity for undergraduate and graduate students to make important contributions to problems in physics that have an impact on electronics technology, often in collaboration with leading scientists in the US and abroad. This experience helps to ignite in him or her the excitement that leads to a successful career in science and engineering. Elinor Chen (upper right), a recent Ph.D. graduate, is presently a Senior Research Project Professional in the Dept. of Radiology at the University of Chicago.

Highly qualified undergraduates are recruited nationwide as part of Lehigh's Research Experiences for Undergraduates program which exposes students, often from small colleges, to university-level research. Quinn Thomas (Drexel Univ.) is shown presenting her research on H in semiconductors at the seminar day that is the capstone of Lehigh's REU program.

